

Appln No. 10/037,897
Amdt date October 24, 2005
Reply to Office action of August 24, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original) A method of measuring an injection lock frequency range for an integrated circuit having a first voltage-controlled oscillator and a second voltage-controlled oscillator, the method comprising the steps of:

applying a control voltage to an input of the second voltage-controlled oscillator such that an output frequency of the second voltage-controlled oscillator locks to an output frequency of the first voltage-controlled oscillator; and

varying the output frequency of the first voltage-controlled oscillator until the output frequency of the second voltage-controlled oscillator falls out of lock with the output frequency of the first voltage-controlled oscillator.

2. (Original) A method as in claim 1, wherein the step of applying the control voltage to the input of the second voltage-controlled oscillator involves the step of switching the input of the second voltage-controlled oscillator from an output of a low pass filter to a control signal to which the control voltage is applied.

3. (Original) A method as in claim 2, wherein the step of applying the control voltage to the input of the second voltage-controlled oscillator further involves the step of:

monotonically changing the control voltage until the output frequency of the second voltage-controlled oscillator locks to the output frequency of the first voltage-controlled oscillator.

4. (Original) A method as in claim 1, wherein the first voltage-controlled oscillator is an element of a first phase-locked loop.

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5. (Original) A method as in claim 4, wherein the step of varying the output frequency of the first voltage-controlled oscillator involves the step of:

changing a frequency of an input stream to the first phase-locked loop.

6. (Original) A method as in claim 5, wherein the second voltage-controlled oscillator is an element of a second phase-locked loop.

7. (Previously Presented) A method of computing an injection signal power within a voltage-controlled oscillator on an integrated circuit, the method comprising the steps of:

determining an injection lock frequency range of the voltage-controlled oscillator;

determining a que of an LC tank within a voltage-controlled oscillator;

determining a free-run frequency of the voltage-controlled oscillator;

determining a free-run output power of the voltage-controlled oscillator; and

calculating an injection signal power value proportional to a product of a square of the injection lock frequency range, a square of the que, and the free-run output power of the voltage-controlled oscillator divided by a square of the free-run output frequency of the voltage-controlled oscillator,

wherein the step of determining an injection lock frequency range comprises the step of measuring an injection lock frequency range of the voltage-controlled oscillator, and

wherein the step of measuring the injection lock frequency range of the voltage-controlled oscillator comprises the steps of:

applying a control voltage to an input of the voltage-controlled oscillator such that the output frequency of the voltage-controlled oscillator locks to an output frequency of another voltage-controlled oscillator on the integrated circuit; and

varying the output frequency of the voltage-controlled oscillator until the output frequency of the voltage-controlled oscillator falls out of lock with the other voltage-controlled oscillator.

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8. (Cancelled)

9. (Cancelled)

10. (Currently Amended) A method as in ~~claim 9~~ claim 7, further comprising the steps of:

wherein the step of applying the control voltage to the input of the voltage-controlled oscillator involves the step of switching the input of the voltage-controlled oscillator from an output of a low pass filter to a control signal to which the control voltage is applied.

11. (Original) A method as in claim 10, wherein the step of applying the control voltage to the input of the second voltage-controlled oscillator further involves the step of:

monotonically changing the control voltage until the output frequency of the second voltage-controlled oscillator locks to the output frequency of the first voltage-controlled oscillator.

12. (Original) A method as in claim 7, wherein the other voltage-controlled oscillator is an element of a first phase-locked loop.

13. (Original) A method as in claim 12, wherein the step of varying the output frequency of the other voltage-controlled oscillator comprises the step of:

changing a frequency of an input stream to the first phase-locked loop.

14. (Original) A method as in claim 13, wherein the voltage-controlled oscillator is an element of a second phase-locked loop.

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15. (Previously Presented) A method of reducing an injection lock frequency range of a second voltage-controlled oscillator in an integrated circuit having first and second voltage-controlled oscillators, the method comprising the steps of:

measuring an injection lock frequency range of the second voltage controlled oscillator;
and

increasing a free-run output power of the second voltage-controlled oscillator,
wherein the step of measuring the injection lock frequency range of the second voltage-controlled oscillator comprises the steps of:

applying a control voltage to an input of the second voltage-controlled oscillator such that an output frequency of the second voltage-controlled oscillator locks to an output frequency of the first voltage-controlled oscillator; and

varying the output frequency of the first voltage-controlled oscillator until the output frequency of the second voltage-controlled oscillator falls out of lock with the output frequency of the first voltage-controlled oscillator.

16. (Cancelled)

17. (Currently Amended) A method as in ~~claim 16~~ claim 15,

wherein the step of applying the control voltage to the input of the second voltage-controlled oscillator involves the step of switching the input of the second voltage-controlled oscillator from an output of a low pass filter to a control signal to which the control voltage is applied.

18. (Original) A method as in claim 17, wherein the step of applying the control voltage to the input of the second voltage-controlled oscillator further involves the step of:

monotonically changing the control voltage until the output frequency of the second voltage-controlled oscillator locks to the output frequency of the first voltage-controlled oscillator.

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19. (Currently Amended) A method as in ~~claim 16~~ claim 15, wherein the first voltage-controlled oscillator is an element of a first phase-locked loop.
20. (Original) A method as in claim 19, wherein the step of varying the output frequency of the first voltage-controlled oscillator involves the step of:
changing a frequency of an input stream to the first phase-locked loop.
21. (Original) A method as in claim 20, wherein the second voltage-controlled oscillator is an element of a second phase-locked loop.
22. (Original) A method as in claim 15, wherein the step of increasing the free-run output power of the second voltage-controlled oscillator is accomplished by increasing a signal amplitude of the second voltage-controlled oscillator.
23. (Original) A method as in claim 15, wherein the step of increasing the free-run output power of the second voltage-controlled oscillator is accomplished by reducing a loading of an output signal of the second voltage-controlled oscillator.
24. (Original) A method as in claim 19, further comprising the step of:
increasing a loop bandwidth in the first phase-locked loop.
25. (Original) A method as in claim 24, wherein the step of increasing the loop bandwidth in the first phase-locked loop is accomplished by increasing a pass band of a loop filter within the first phase-locked loop.

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26. (Original) A method of reducing intermodulation between a first voltage-controlled oscillator (VCO) in a first phase-locked loop (PLL) and a second VCO in a second PLL, comprising:

measuring an injection lock frequency range of the second VCO with respect to the first VCO;

measuring a signal power of the second VCO;

determining a crosstalk power between the first and the second VCOs using the measured injection lock frequency range and the measured signal power of the second VCO; and

adjusting a signal power ratio between the first VCO and the second VCO to reduce intermodulation.

27. (Original) The method of claim 26 further comprising adjusting a loop bandwidth of the first PLL relative to that of the second PLL to reduce intermodulation.

28. (Currently Amended) The method of claim 27 wherein the first PLL is part of a transmitter and the second PLL is part of a receiver, and wherein the step of adjusting a signal power ~~[[ration]]~~ ratio comprises increasing a power of the first VCO relative to that of the second VCO.

29. (Original) The method of claim 28 wherein the step of adjusting a loop bandwidth comprises increasing a loop bandwidth of the second PLL relative to that of the first PLL.

30. (Original) A transceiver circuit comprising:
a transmitter having a first phase-locked loop (PLL), the first PLL having a first voltage-controlled oscillator (VCO);
a receiver having a second PLL, the second PLL having a second VCO; and

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a parasitic loop that couples signals between the transmitter and the receiver causing intermodulation,

wherein, the first VCO is configured to have a different power level relative to that of the second VCO to reduce the intermodulation.

31. (Original) The transceiver of claim 30 wherein the first VCO is configured to have a power level that is greater than that of the second VCO.

32. (Original) The transceiver of claim 30 wherein the first PLL is configured to have a bandwidth that is different than a bandwidth of the second PLL.

33. (Original) The transceiver of claim 32 wherein the second PLL is configured to have a bandwidth that is greater than the bandwidth of the first PLL.

34. (Original) The transceiver of claim 31 wherein the second PLL is configured to have a bandwidth that is greater than a bandwidth of the first PLL.